National Semiconductor

T-27-545

ORIGINAL

# NSN3XX, NSB3XXX 0.3" Multidigit LED Numeric Display Series

## General Description

Multidigit GaAsP LED reflective displays from National Semiconductor represent the latest in design advances in the 0.3" format. The series provides the designer with an effective, easy to implement answer to the need for an inexpensive large numeric display.

Basically 2-digit and 4-digit displays, the units are end stackable for applications requiring additional digits. When combined with the options for overflow, polarity and other indications, virtually all display requirements can be satisfied. Versatility is offered the designer with direct drive and multiplex versions in both the common anode and common cathode forms. Electrical contact is by PCB type terminals on the edges of the display.

The optical design of this display series creates a distinct easy-to-read display with a wide viewing angle, excellent ON-OFF contrast and segment uniformity.

## Features

- Multidigit packages prematched for brightness
- End stackable dual and quad formats to fit your application
- PC board mounted units for low cost
- Common anode, common cathode, multiplexed, or direct drive

## Applications

- Test and measurement equipment
- Consumer products
- Instrumentation
- Industrial controls
- Digital instruments
- Desk top calculator
- Clocks
- Elevator floor indicator
- TV channel indicator

## Absolute Ratings

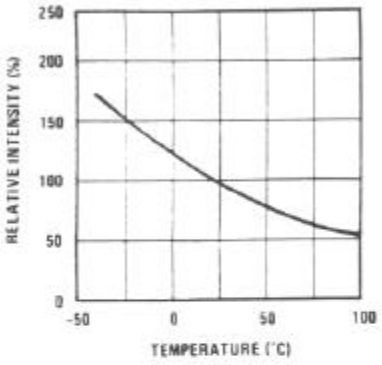
| | |
|---|---|
| Average Current/Segment | 20 mA max |
| Peak Current/Segment | 75 mA max |
| Reverse Voltage/Segment | 3.0V max |
| Operating and Storage Temperature | −20 °C to +70 °C |
| Relative Humidity at 35 °C | 98% |
| Terminal Temperature (Soldering, 5 seconds) | 230 °C |

## Electrical and Optical Characteristics $T_A = 25\,°C$

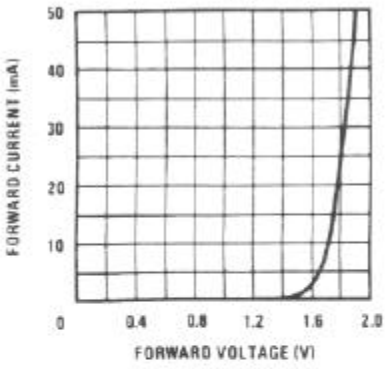
| Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Segment Light Intensity (Peak) | 10 mA/Seg. Peak | 0.10 | 0.20 | | mcd |
| Digit and DP Light Intensity (Peak) | 10 mA/Seg. Peak | 0.80 | 1.6 | | mcd |
| Segment Forward Voltage | 10 mA/Seg. Peak | | 1.7 | 2.0 | V |
| Segment Reverse Voltage | 100 μA/Seg. | 3.0 | 8.0 | | V |
| Peak Wavelength | | | 660 | | nm |
| Spectral Width, Half-Intensity | | | 40 | | nm |
| Viewing Angle, Off Axis | | | 60 | | degrees |
| Intensity Matching | 10 mA/Seg. Avg. | | ±33 | | % |

## Performance Characteristics Curves

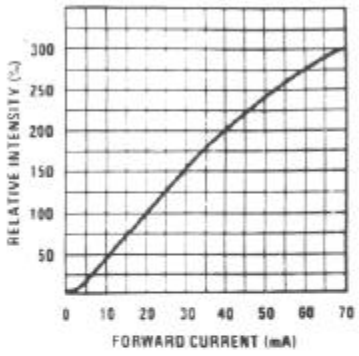
Light Intensity vs Ambient Temperature



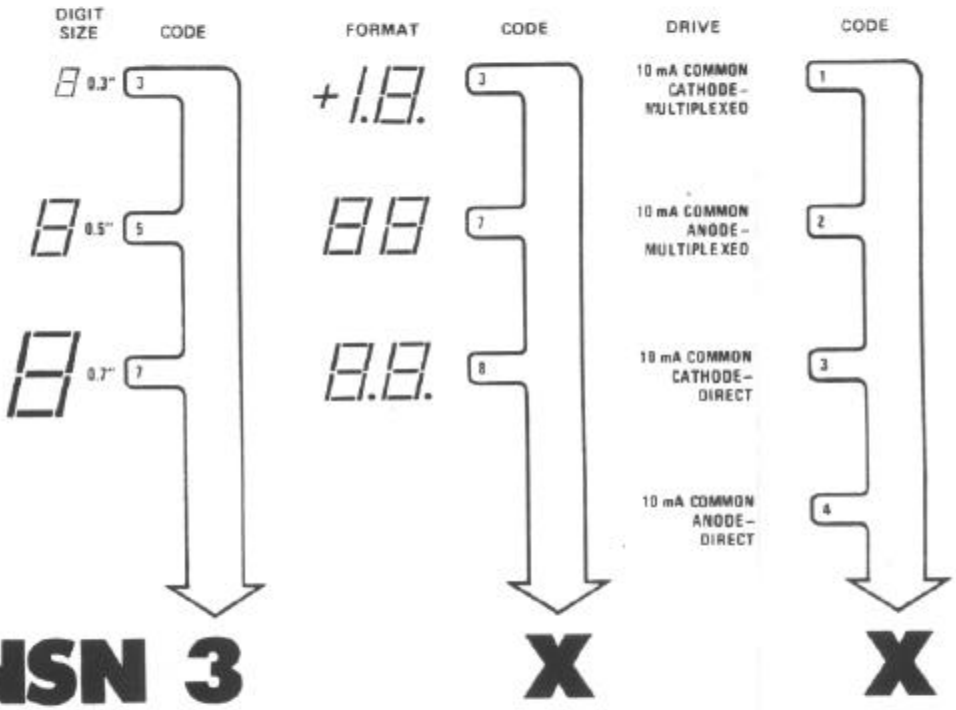

Forward Current ($I_F$) vs Forward Voltage ($V_F$)




Light Intensity vs Forward Current ($I_F$)

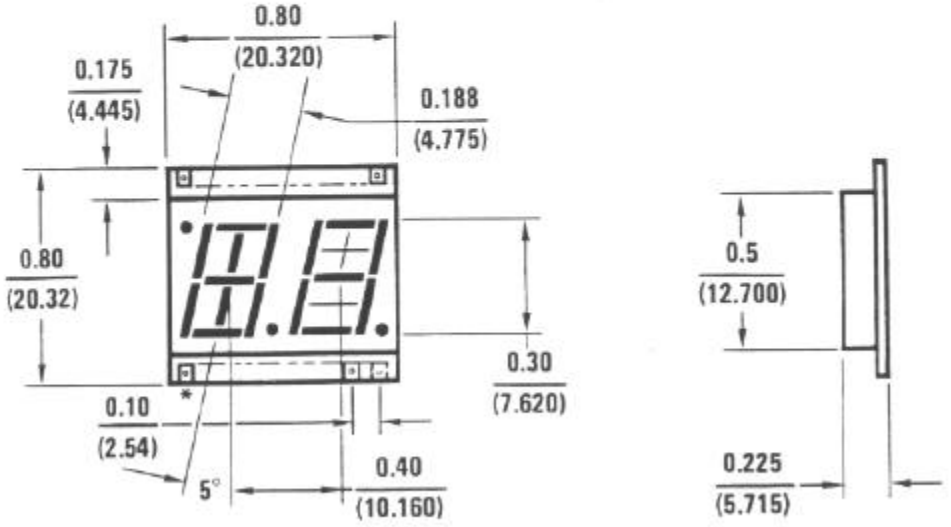



## Available Display Formats (Dual Digits)



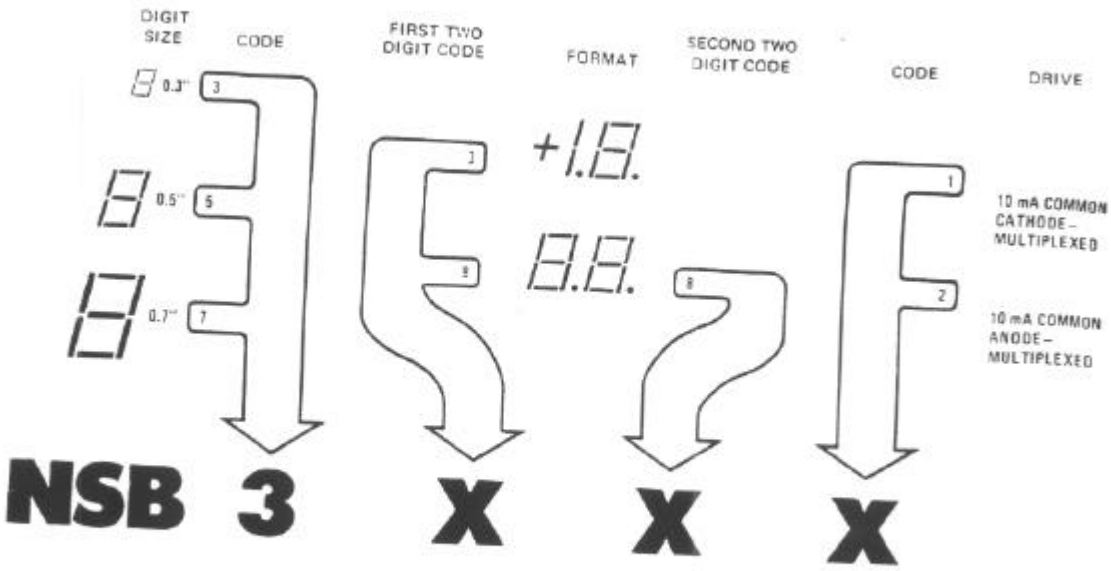

| DEVICES CURRENTLY AVAILABLE | |
|---|---|
| NSN334 | +1.8. |
| NSN373 | 88 |
| NSN374 | 88 |
| NSN381 | 8.8. |
| NSN382 | 8.8. |

## Physical Dimensions inches (millimeters)



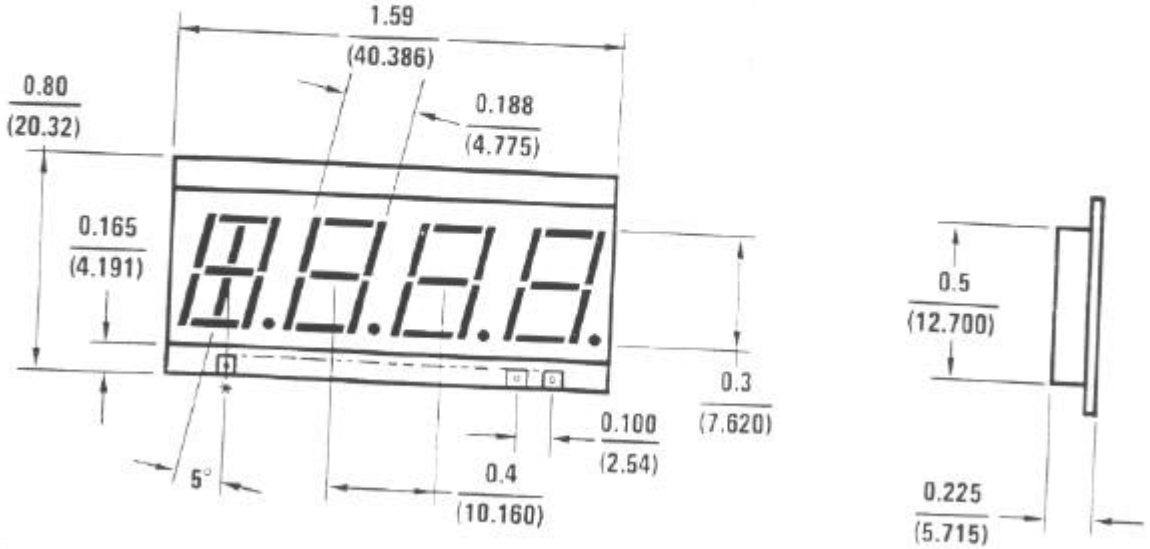

*Pin 1 as shown, pin out follows counterclockwise

## Available Display Formats (Quad Digits)




| DEVICES CURRENTLY AVAILABLE | |
|---|---|
| NSB3382 | +1.8.8.8. |
| NSB3881 | 8.8.8.8. |
| NSB3882 | 8.8.8.8 |

## Physical Dimensions inches (millimeters)




*Pin 1 as shown, pin out follows counterclockwise

## Connection Tables (Dual Digits)

| Pin Number | NSN334 | NSN373 | NSN374 | NSN381 | NSN382 |
|---|---|---|---|---|---|
| 1 | Cathode J Digit 1 | Anode G Digit 1 | Cathode G Digit 1 | Anode G | Cathode E |
| 2 | Cathode C Digit 1 | Anode E Digit 1 | Cathode E Digit 1 | Anode E | Common Anode Digit 1 |
| 3 | Cathode DP Digit 1 | Anode D Digit 1 | Cathode D Digit 1 | NC | NC |
| 4 | Cathode G Digit 2 | Anode C Digit 1 | Cathode C Digit 1 | Common Cathode Digit 1 | Cathode C |
| 5 | Cathode E Digit 2 | Anode G Digit 2 | Cathode G Digit 2 | Anode D | Common Anode Digit 2 |
| 6 | Cathode D Digit 2 | Anode E Digit 2 | Cathode E Digit 2 | Common Cathode Digit 2 | Cathode D |
| 7 | Cathode C Digit 2 | Anode D Digit 2 | Cathode D Digit 2 | Anode DP | Cathode DP |
| 8 | Cathode DP Digit 2 | Anode C Digit 2 | Cathode C Digit 2 | Anode C | Cathode G |
| 9 | Cathode B Digit 2 | Common Cathode Digits 1 and 2 | Common Anode Digits 1 and 2 | Anode B | Cathode B |
| 10 | NC | Anode B Digit 2 | Cathode B Digit 2 | NC | NC |
| 11 | Cathode A Digit 2 | Anode A Digit 2 | Cathode A Digit 2 | NC | NC |
| 12 | Cathode F Digit 2 | Anode F Digit 2 | Cathode F Digit 2 | NC | NC |
| 13 | Cathode B Digit 1 | Anode B Digit 1 | Cathode B Digit 1 | Anode A | Cathode A |
| 14 | Common Anode Digits 1 and 2 | Anode A Digit 1 | Cathode A Digit 1 | NC | NC |
| 15 | Cathode H Digit 1 | Anode F Digit 1 | Cathode F Digit 1 | Anode F | Cathode F |
| 16 | Cathode G Digit 1 | NC | NC | NC | NC |

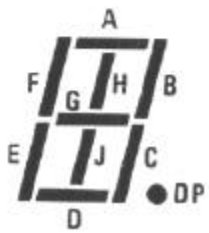
| Device Type | Format | | Drive |
|---|---|---|---|
| NSN334 | +1.8. | | Common Anode—Direct |
| NSN373 | 88 | No DP | Common Cathode—Direct |
| NSN374 | 88 | No DP | Common Anode—Direct |
| NSN381 | 8.8. | | Common Cathode—Multiplexed |
| NSN382 | 8.8. | | Common Anode—Multiplexed |

## Connection Tables (Quad Digits)

| Pin Number | NSB3382 | NSB3881 | NSB3882 |
|---|---|---|---|
| 1 | NC | NC | NC |
| 2 | Cathode E | Anode E | Cathore E |
| 3 | Common Anode Digit 1 | Common Cathode Digit 1 | Common Anode Digit 1 |
| 4 | Cathode J Digit 1 | NC | NC |
| 5 | Cathode H Digit 1 | NC | NC |
| 6 | Common Anode Digit 2 | Common Cathode Digit 2 | Common Anode Digit 2 |
| 7 | Cathode D | Anode D | Cathode D |
| 8 | Cathode G | Anode G | Cathode G |
| 9 | NC | NC | NC |
| 10 | Common Anode Digit 3 | Common Cathode Digit 3 | Common Anode Digit 3 |
| 11 | Cathode B | Anode B | Cathode B |
| 12 | Cathode A | Anode A | Cathode A |
| 13 | Cathode F | Anode F | Cathode F |
| 14 | Common Anode Digit 4 | Common Cathode Digit 4 | Common Anode Digit 4 |
| 15 | Cathode DP | Anode DP | Cathode DP |
| 16 | Cathode C | Anode C | Cathode C |

| Device Type | Format | Drive |
|---|---|---|
| NSB3382 | +1.8.8.8. | Common Anode—Multiplexed |
| NSB3881 | 8.8.8.8. | Common Cathode—Multiplexed |
| NSB3882 | 8.8.8.8. | Common Anode—Multiplexed |

## Segment Identification



## Recommended Display Processing

The multidigit series display is constructed on a standard printed circuit board substrate and covered with a plastic lens. The edge connector tab will stand a temperature of 230 °C for 5 seconds. The display lens area must not be elevated in temperature above 70 °C. To do so will result in permanent damage to the display. Since the display is not hermetic, immersion of the entire package during flux and clean operations may cause condensation of flux or cleaner on the underside of the lens. It is recommended that only the edge connectors be immersed. Only rosin core solder, solid core solder, and low activity organic fluxes are recommended. Cleaning solvents are Freon TF, Isopropanol, Methanol, or Ethanol. These solvents are recommended only at room temperature and for short time periods. The use of other solvents or elevated temperature use of the recommended solvents may cause permanent damage to the lens or display.

## Special Formats

National is constantly adding new formats to its line of LED displays; For example:

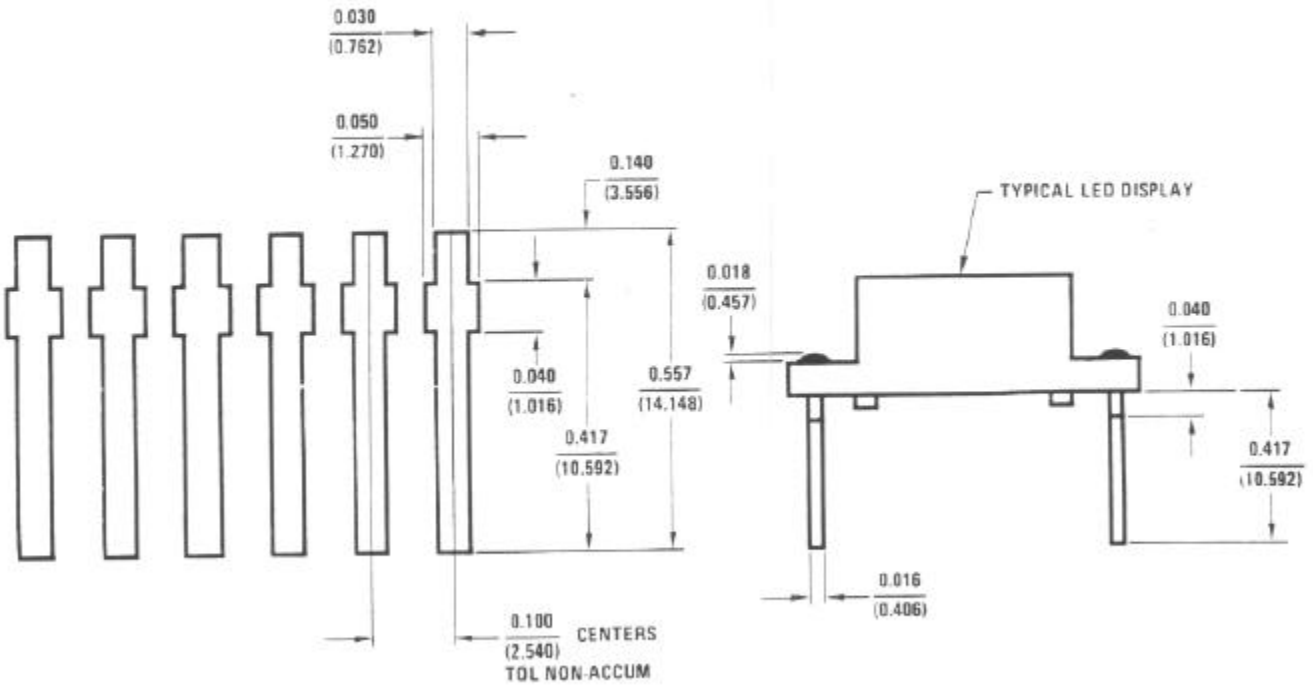
NSB3411 Clock Display 0.3 inch, 4-digit display, 24-hour format with colon and AM/PM indicator, common cathode multiplexed drive.

## Optional Pins

The standard LED numeric display offers a great deal of flexibility in mounting through the use of PCB edge connections. However, many designers prefer that pins be added to the PCB prior to shipping.

The standard pin used by NSC is outlined below and may be ordered by simply adding the designation "Flow 12" to the standard part number. Minimum order quantities and additional costs are involved, so check with the National Sales Office nearest you for more information.

For a complete discussion of various mounting techniques, consult the application note on "Mounting Techniques for Multidigit LED Numeric Displays," AN-170.




All dimensions are in inches (millimeters)